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The genus *Sowerbyella* (*Pezizales*) in China

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Abstract — Studies on collections of *Sowerbyella* resulted in recognition of four species of the genus in China. A new species, *S. laevispora*, on mossy soil in *Picea* forest from Qinghai Province in northwestern China is described and illustrated. It is similar to *S. rhenana* in apothecial shape and anatomic structure, and distinct from that fungus in wider and shorter ascospores and shorter asci, and from all known species of the genus by its smooth-walled ascospores.

Key words — morphology, SEM, taxonomy

Introduction

Sowerbyella Nannf., a well defined genus of *Pyronemataceae*, contains a group of fungi with bright colored, cupulate and stipitate apothecia, angular cells in ectal excipulum with short hyphoid cell extensions or minute pustules on outer surface, interwoven hyphae in medullary excipulum, a well- to poorly-developed subhymenium, operculate asci, and ornamented ascospores (Moravec 1988a, Yao & Spooner, 2006). About eleven or twelve species have commonly been recognized in the world. Apothecial shape, size and color, ascospore shape, size and type of ornamentations are important criteria in taxonomy of the genus.

The genus was first reported from China by Korf & Zhuang (1985) with a single species from Sichuan Province as *Aleuria rhenana* Fuckel. It was later transferred to *Sowerbyella* by Moravec (1986). Additional species discovered were *S. radiculata* from Qinghai Province (Zhuang 1998) and *S. angustispora* from Jilin Province (Moravec 1988a). The latter was later erroneously recorded from Beijing and Qinghai as "*S. fagicola* J. Moravec" (Zhuang & Wang 1997, Zhuang 1998). This recent study of the genus reports a new species distinguished by its smooth-walled ascospores.

Material and methods

Old and recent collections of *Sowerbyella* from China on deposit in the Mycological Herbarium, Chinese Academy of Sciences (HMAS) and

Cryptogamic Herbarium, Kunming Institute of Botany, Chinese Academy of Sciences (HKAS) were examined. Apothecia were rehydrated and sectioned by a freezing microtome (YD-1508A, Yidi Medical Instrument Co., Jinhua, China) at the thickness of 20–25 μm. Measurements were taken from sections mounted in cotton blue-lactophenol solution and from squash mounts. For SEM study of the spore surface morphology, a portion of hymenium was cut and stuck directly on a stub. The materials were coated with gold-palladium and observed with SEM (FEI Quanta 200). Photographs were taken with a digital camera (Canon G5, Tokyo, Japan) connected with a microscope (Zeiss Axioskop 2 plus).

Taxonomy

Sowerbyella angustispora J.Z. Cao & J. Moravec, in Moravec, Mycol. Helvet. 3(1): 136, 1988.

Specimens examined: CHINA. Beijing, Mount. Baihua, on the ground in forest, 18-XI-1995, W.Y. Zhuang & Z. Wang 1197, HMAS 70323; Beijing, Mount. Baihua, on the ground in forest, 20-XI-1995, W.Y. Zhuang & Z. Wang 1254, 1256, 1267, HMAS 70324, 70325, 70326; Qinghai, Qilian, on the ground, 3-VIII-1996, X.L. Mao & S.X. Sun 9307, HMAS 71958. (previously filed under *Sowerbyella fagicola*)

Notes: This is a very characteristic fungus and featured by its small, fusoid-ellipsoid and narrow ascospores (12–15.5 × 4.8–7 μm) with minute, separate, conical ornamentations on the spore surface (Moravec 1988a,b). A detailed description and illustrations of the fungus were provided by the original authors. Unfortunately the holotype specimen from Jilin Province, China seems very difficult or impossible to locate. This fungus is relatively common in the northern part of China but has not been reported from any other country.

The previous Chinese records of *Sowerbyella fagicola*, a fungus with a similar spore shape to *S. angustispora* but with larger ascospores, based on collections from Beijing and Qinghai, were misidentifications (Zhuang & Wang 1997, Zhuang 1998). Re-examinations of the above specimens indicate that the correct name for these collections is *S. angustispora*.

Sowerbyella laevispora W.Y. Zhuang, **sp. nov.** Figs 1–6

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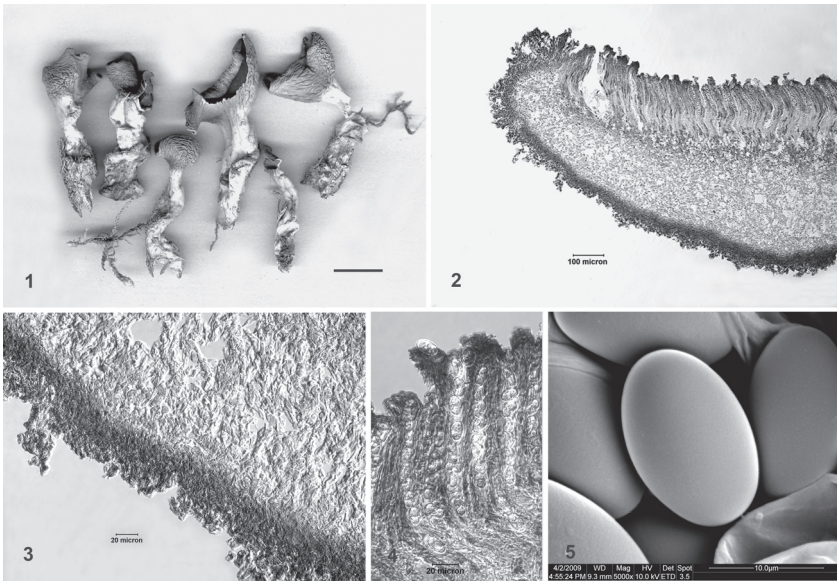
Apotheciis cupulatis, stipitatis; ascis cylindricis, 8-sporis, 216–262 × 14–16 μm; ascosporis ellipsoideis, laevibus, 17–20.5 × 10–13.5 μm.

Holotype: CHINA. Qinghai, Huangcheng, on mossy soil in *Picea* forest, 9-IX-1958, Q.M. Ma 1039, HMAS 33796 (previously filed under *Aleuria rhenana*).

Etymology: refers to the smooth ascospore surface morphology.

Dried apothecia deep-cupulate, long-stipitate, 8–16 mm in diam., hymenium surface brown, receptacle surface orange-brown, stipe dirty cream, up to 25 mm



Figs 1–5. *Sowerbyella laevispora* (from holotype): 1. Dried apothecia, scale bar = 12 mm; 2. Portion of apothecium in longitudinal section; 3. Anatomic structure of excipulum; 4. Portion of hymenium showing asci with ascospores; 5. SEM of ascospores showing surface morphology.

long and 5–9 mm wide, with 2–4 longitudinal shallow furrows; ectal excipulum of textura angularis, 45–75 µm thick (excluding cell extensions), with short, hyphoid cell extensions on surface, cells angular, isodiametric to ellipsoidal, thin-walled, subhyaline, 20–50 × 16–38 µm, cell extensions or minute pustules 20–35 µm high; medullary excipulum of textura intricata, 200–410 µm thick or even thicker, hyphae thin-walled, hyaline, 3–9 µm wide; subhymenium poorly developed, 0–20 µm thick; hymenium 250–280 µm thick; asci subcylindrical, 8-spored, J– in Melzer's reagent, 216–262 × 14–16 µm; ascospores ellipsoid to broadly ellipsoid, hyaline, smooth, unicellular, biguttulate, uniseriate, 17–20.5 × 10–13.5 µm; paraphyses filiform, septate, 3–4 µm wide at apex and 2–3 µm below.

Notes: As commonly accepted, *Sowerbyella* contains species with ascospore surface ornamented without exceptions (Moravec 1988a, Yao & Spooner 2006). The new species possesses all the features of the genus except for its smooth-walled ascospores. To avoid establishing a new genus based on a single character, the generic concept is thus extended to accommodate species having smooth ascospores.

The type specimen of *S. laevispora* was previously filed under "*Aleuria rhenana*", which indicates that the new species is similar to *S. rhenana* in gross

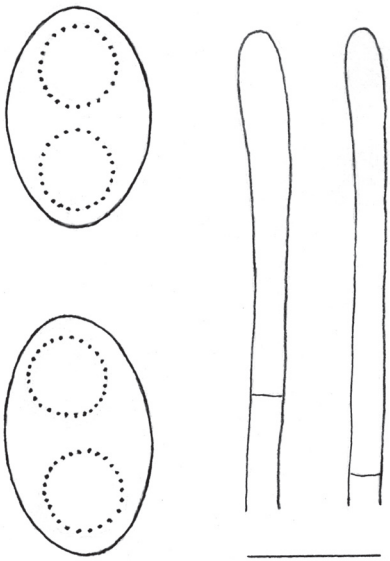


Fig 6. *Sowerbyella laevispora* (from holotype): Ascospores and paraphysis apices. Scale bar = 10 μm.

morphology. But observation under light microscope and SEM study reveal that its ascospores are wider and shorter than those of *S. rhenana* [17–20.5 × 10–13.5 μm vs. 18–23.6(–26.3) × 9–11.8 μm] and smooth-walled instead of possessing characteristic reticulate spore markings, and its asci are shorter (216–262 × 14–16 μm vs. 270–350 × 11–15 μm) (Rifai 1968).

Sowerbyella radiculata (Sowerby) Nannf., Svensk Bot. Tidskr. 32: 119, 1938.

≡ *Peziza radiculata* Sowerby, Col. Fig. Engl. Fung. Mushr. 1: pl. 114, 1797.

≡ *Lachnea radiculata* (Sowerby) W. Phillips, Man. Brit. Discomyc. p. 202, 1887.

≡ *Pseudotis radiculata* (Sowerby) Boud., Hist. Class. Discom. Eur. p. 52, 1907.

Specimen examined: CHINA. Qinghai, Qilian, on the ground in forest, 13-VIII-1996, X.L. Mao & S.X. Sun 9294, HMAS 71957.

Sowerbyella rhenana (Fuckel) J. Moravec, Mycol. Helv. 2(1): 96, 1986.

≡ *Aleuria rhenana* Fuckel, Jb. Nassau. Ver. Naturk. 23–24: 325, 1870.

Specimens examined: CHINA. Sichuan, Derong, Jinsha River, on the ground in forest, 16-VIII-1981, X.J. Li, HKAS 8644, HMAS 72008; Sichuan, on the ground in forest, 7-VIII-1981, X.J. Li, HMAS 58211; Qinghai, Datong, on the ground in forest, 13-VIII-1996, X.L. Mao & S.X. Sun 9249, 9302, HMAS 71959, 71960; Qinghai, Datong, on the

ground in forest, 14-VIII-1996, J. Y. Zhuang 5684, HMAS 71970; Qinghai, Menyuan, on mossy soil under *Picea* forest, 19-VIII-2004, W.Y. Zhuang & C.Y. Liu 5410, HMAS 97556.

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